

## 1 WIPER BLADE FOR WINDOWS, IN PARTICULAR OF MOTOR VEHICLES

## 3 Related Art

5 In wiper blades of the type described in the preamble of Claim 1, the carrier  
6 element is intended to insure the most even distribution possible of the wiper  
7 blade contact pressure against the window exerted by a wiper arm connected to  
8 the wiper blade over the entire wiping field covered by the wiper blade. Due to a  
9 corresponding curvature of the non-loaded carrier element—i.e., when the wiper  
10 blade does not lie against the window—the ends of the wiper strip lying fully  
11 against the window during the wiping operation of the wiper blade are loaded  
12 toward the window by way of the carrier element, which is then taut, even if the  
13 curvature radii of spherically curved motor vehicle windows change with each  
14 position of the wiper blade. The curvature of the wiping blade must therefore be  
15 somewhat greater than the greatest curvature measured in the wiping field of the  
16 window to be wiped. The carrier element therefore replaces the expensive  
17 carrying strap construction having two loose springs situated in the wiper strip, as  
18 implemented in traditional wiper blades (DE-OS1505357)

20 The invention is based on a wiper blade according to the preamble of Claim 1.  
21 With the known wiper blade of this type (DE-GM publication 29611722.6), the  
22 two springs are connected to each other as a single part by way of transverse  
23 ribs situated on both of its ends. Since these transverse ribs are located in the  
24 plane of the springs, one of the end sections of the slit lying between the  
25 longitudinal edges facing each other and enclosed by the springs and the  
26 transverse ribs must be expanded in such a fashion that the wiper strip can be  
27 properly installed in the slit. However, this act of expansion can  
28 disadvantageously change the spring properties of the carrier element in terms of  
29 the intended wiping results. Additionally, it is cost-intensive to manually insert the  
30 wiper strip in the slit by way of this expansion. Moreover, the wiper strip of the  
31 known wiper blade must be shorter than the springs, the two ribs of which

1 situated on their ends lie outside the wiper strip. As a result, the height of the  
2 wiping field determined by the length of the wiper strip can not always be  
3 designed to the maximum, because the transverse ribs extending beyond the  
4 ends of the wiper strip must be taken into account.

## 6 Advantages of the Invention

8 In addition to the considerable advantages in the design of the carrier element in  
9 terms of its spring properties and the particularly simple, cost-effective installation  
10 of the wiper strip in the carrier element—the wiper strip can be slid between the  
11 springs of the carrier element from one of the two open longitudinal ends,  
12 whereby the bridge-like transverse ribs do not stand in the way of this installation  
13 procedure—the length of the carrier element can now also be adapted to the  
14 length of the wiper strip. In specifying the height of the wiping field and  
15 determining the distance between the window wiper on the driver's side and the  
16 window wiper on the passenger's side, as well as the distance between the two  
17 wiper shafts used with pendulum wiper systems, no carrier element transverse  
18 ribs projecting above the wiper strip need to be taken into account.

20 Problem-free installation of the wiper blade is guaranteed when the means of  
21 attachment can be brought into their securing position after the wiper strip is  
22 positioned in the carrier element.

24 A simple, cost-effective shaping of the springs is possible when the means of  
25 attachment are situated on one of the transverse ribs.

27 An unrestricted adaptation of the wiper strip to the constantly changing window  
28 curvature is possible during wiping operation if the means of attachment are  
29 situated on a transverse rib that is located in the region of one of the end  
30 sections of the two springs.

1 So that the means of attachment do not impair the sliding path for the wiper strip,  
2 the means of attachment comprise an extension designed in the shape of a  
3 tongue that extends from the center section of one transverse rib to the other end  
4 section of the two springs.

5  
6 Furthermore, when the extension designed in the shape of a tongue grips a non-  
7 sensitive region of the wiper strip, e.g., a cover strip of the wiper strip located  
8 above the two longitudinal grooves as well as above the top strap surfaces of the  
9 springs, the wiping quality is not impaired by the act of fixation.

10  
11 This can be realized in particularly simple fashion when the extension designed  
12 in the shape of a tongue has at least one projection pointing toward the cover  
13 strip of the wiper strip as the fixing means.

14  
15 A reliable anchoring of the wiper strip in the carrier element is achieved when the  
16 free end of the projection is designed in the shape of a bezel.

17  
18 In certain applications, it can be advantageous when multiple projections pointing  
19 toward the back strip are situated on the extension designed in the shape of a  
20 tongue as the fixing means.

21  
22 A stable and permanent anchoring of the wiper strip in the carrier element is  
23 achieved when the transverse ribs as well as the extension designed in the  
24 shape of a tongue connected as a single part to one of the transverse ribs are  
25 made out of metal.

26  
27 Additional advantageous further developments and designs of the invention are  
28 indicated in the following description of embodiments presented in the  
29 accompanying diagram.

30

## Diagram

Figure 1 shows a side view of a wiper blade according to the invention, Figure 2 shows a straight representation of the wiper blade according to Figure 1 not drawn to scale and drawn perspectively, whereby a protective cap situated on the ends of the wiper blade is removed, Figure 3 shows an enlarged view of an item labelled with "III" in Figure 2, Figure 4 shows a sectional longitudinal view through the wiper blade according to Figure 2 along the line IV-IV in an enlarged representation, Figure 4a shows the arrangement according to Figure 4 in an intermediate installation position, Figure 5 shows the end section from Figure 3 of the carrier element belonging to the wiper blade rotated by 180°, Figure 6 shows the arrangement according to Figure 5 in another embodiment of the invention, and Figure 7 shows the sectional area of a section through the item according to Figure 3 along the line VII-VII.

## Description of the Embodiments

A wiper blade 10 shown in Figures 1 and 2 comprises a long, spring-elastic carrier element 12 designed in the shape of a strap, on the underside 13 of which a long, rubber elastic wiper strip 14 is situated parallel to the longitudinal axis. The part 16 of a connecting device on the side of the wiper blade is situated directly on the top 11 of the carrier element 12—also referred to as a spring bar—in its center section. Using the connecting device, the wiper blade 10 can be connected in detachable and hinged fashion to a driven wiper arm 18 indicated in Figure 1 by a dash-dotted line. To achieve this, the part of the connecting device on the wiper arm side is provided on the free end of the wiper arm 18. The wiper arm 18 is loaded in the direction of the arrow 20 toward the window to be wiped, e.g., toward the windshield of a motor vehicle window, the surface of which to be wiped is indicated in Figure 1 using a dash-dotted line. Since the line 22 is intended to represent the greatest curvature of the window surface, it is clear that the curvature of the wiper blade 10—not yet loaded, and

1 lying against the window with both of its free ends—is greater than the maximum  
2 window curvature (Figure 1). Under the contact pressure (arrow 20), the wiper  
3 blade 10 lies against the window surface 22 with its wiper lip 24 along its entire  
4 length. Tension thereby builds up in the spring-elastic carrier element 12 made  
5 out of metal, for example, that insures the proper placement of the wiper strip 14  
6 and the wiper lip 24 with its entire length against the window, and insures an  
7 even distribution of the contact pressure.

8  
9 A first embodiment of the wiper blade 10 shall be described below in greater  
10 detail using Figures 3 and 7. It is obvious in Figure 7 that the carrier element 12  
11 of the wiper blade 10 lies at a distance 26 in front of the window 22 to be wiped.  
12 Its arrangement is therefore selected so that its strap surfaces 11 and 13 are  
13 located in a plane that extends basically parallel to the window surface 22 to be  
14 wiped. The carrier element 12 has two springs 28 and 30 designed in the shape  
15 of a strap lying in a common plane parallel to each other. The inner longitudinal  
16 edges 32 facing each other are thereby located at a distance 34 from each other.  
17 They are connected to each other by way of a bridge-like transverse rib 36 on  
18 each of the two ends of the springs 28, 30; they are welded together, for  
19 example. Each bridge-like transverse rib thereby lies with both of its end sections  
20 40 on the top 11 of the carrier element 12 and its springs 28, 30 (Figure 5). Each  
21 of the two transverse ribs 36 has a center section 42 that is located at a distance  
22 44 from the top strap surface 11 of the springs and that therefore gives it its  
23 bridge-like shape. Since the longitudinal extension 46 of the center sections  
24 42—also referred to as the bridge width—is greater than the distance 34  
25 between the inner longitudinal edges 32 facing each other, the two springs 28  
26 and 30 extend with inner side strips 48 into the region of the center sections 42,  
27 whereby the side strips 48 are situated at a distance 44 below the center  
28 sections 42. In addition to the tasks of the carrier element 12 mentioned  
29 previously with regard for distribution of contact pressure, this is also intended to  
30 insure a stressfree guidance of the wiper strip 14 in accordance with  
31 specifications, and, therefore, low-noise wiping operation. This is also achieved

1 by way of the dimensional coordination between the carrier element 12 and the  
2 wiper strip 14 described below.

3  
4 The wiper strip 14 of this first embodiment has a cross section illustrated in  
5 Figures 3 and 7. It has a top brace 50 with which the wiper lip 24 performing the  
6 actual wiping work is connected by way of a narrow strip segment 52. The  
7 arrangement of the strip segment 52 makes it possible for the wiper lip 24 to tilt  
8 during the wiping motion into a dragging position that performs the act of wiping  
9 and that is known by the expert. The top brace 50 is provided with longitudinal  
10 grooves on its opposite longitudinal sides that are open-sided toward these  
11 longitudinal sides. The longitudinal grooves 54 and 56 serve to accommodate the  
12 inner side strips 48 of the springs 28 and 30. The depth of the longitudinal  
13 grooves 54 and 56 is selected to insure that a wall 58 remains between the two  
14 longitudinal grooves. The top brace 50 therefore has a base strip 60 and a cover  
15 strip 62 which are connected to each other by the wall 58. The thickness 64 of  
16 the wall 58 is less than the distance 34 between the inner longitudinal edges 32  
17 of the springs 28, 30, and it is smaller than the distance between the inner side  
18 strips 48. The width of the two longitudinal grooves 54 and 56 in the top brace 50  
19 is coordinated with the thickness of the springs 28, 30 and their inner side strips  
20 48 in such a manner that a stressfree attachment of the wiper strip 14 to the  
21 carrier element 12 is guaranteed when the wiper strip is assembled with the  
22 carrier element 12 (Figures 3 and 7). Since the width 66 of the cover strip 62 is  
23 also somewhat smaller than the bridge width 46 of the center section 42, and its  
24 thickness 68 is less than the distance 44 between the center section 42 and the  
25 top sides 11 of the springs 28, 30, the wiper strip 14—which is manufactured  
26 cost-effectively using an extrusion process and has a uniform cross section over  
27 its entire length—can be slid into the carrier element 12 in the longitudinal  
28 direction without difficulty and thereby be connected with it in stressfree fashion.  
29  
30 The part 16 of the connecting device for the wiper arm situated in the center  
31 section of the wiper blade 10 encloses each of the outer side strips 72 of the

1 springs 28, 30 and the carrier element 12 extending out of the longitudinal  
2 grooves 54 and 56 (Figure 2). The joint between the part 16 and the carrier  
3 element 12 can be positive and/or non-positive. A welded joint as for the  
4 transverse ribs 36 is also feasible. The part 16 of the connecting device, like the  
5 transverse ribs 36 on the ends, therefore forms a center transverse rib which, like  
6 the transverse ribs 36, also helps to stabilize the wiper blade and also makes it  
7 possible to connect the wiper arm 18 and the wiper blade 10. With a  
8 corresponding length of the wiper blade 10, it can also be advantageous if further  
9 corresponding transverse ribs are situated between the two transverse ribs 36  
10 situated on the ends. To prevent injuries that occur in handling the wiper blade, in  
11 particular by end users, a protective cap 70 is situated on both springs 28, 30  
12 and on the transverse ribs 36 on the ends which is preferably made out of plastic  
13 and which preferably snaps into place (Figures 1 and 2).

14  
15 As mentioned previously, the wiper strip 14 should be guided onto the carrier  
16 element 12 in stressfree fashion so the wiper lip 24 can adapt to the changing  
17 course of curvature of the window surface 22 during the wiping operation. To  
18 prevent the situation in which the wiper lip 14 can thereby wander out of the  
19 springs 28, 30 of the carrier element 12 in the longitudinal direction, the carrier  
20 element 12 is provided with means of attachment on one of the transverse ribs  
21 36 that are preferably brought into active connection with the wiper strip after the  
22 wiper strip 14 is slid into the carrier element 12.

23  
24 In a first embodiment of the invention (Figures 3 through 5), these means of  
25 attachment comprise an extension 74 designed in the shape of a tongue that is  
26 connected as a single part with the center section 42 of the transverse rib 36  
27 made out of a metal. The extension 74 extends from the center section 42 to the  
28 other end section of the two springs 28, 30. On its free end, the extension 74  
29 comprises a projection 76 acting as a fixing means for the wiper strip 14 and  
30 pointing toward the cover strip 62, which is designed in the shape of a bevel on  
31 its free end 78. Before the wiper blade is installed, the extension 74 is bent out of

1 the plane of its center section 42 so far that the extension of the bridge-like  
2 passage between the springs 28, 30 and the center section 42 is open (compare  
3 Figures 4a and Figure 5), so that the wiper strip 14 can therefore be easily  
4 installed via sliding into the carrier element 12. When this has reached its  
5 specified position in relation to the carrier element 12, the extension 74 is bent in  
6 the direction of the arrow 80 so that the projection 76 penetrates—cuts into or  
7 elastically deforms—the cover strip 62 of the wiper strip 14 with its bezel 78 and  
8 fixes the wiper blade into position (Figure 4). The means of attachment 74, 76, 78  
9 can therefore be brought into their securing position after the wiper strip is  
10 positioned on the carrier element. Such a fixing into position takes place  
11 advantageously at only one point so that an optimal adaptation of the wiper strip  
12 to the changing window curvature is insured. The illustration in Figure 5 shows  
13 the end of the carrier element 14 shown in Figure 3, i.e., without the wiper strip  
14 14, but viewed in the opposite direction. The transverse rib present on the other  
15 end of the carrier element—covered by the protective cap 70 in Figure  
16 2—comprises no means of attachment to secure the wiper strip on the carrier  
17 element, for the reason mentioned previously. The transverse rib 36 shown in  
18 Figure 2 with its extension 74 is also covered by a cap 70, of course, when the  
19 wiper blade is fully assembled (refer to Figure 1).

20  
21 For special applications of the invention and according to another embodiment  
22 shown in Figure 6, the transverse rib 136—the basic design of which is identical  
23 to the transverse rib 36 described above—and its extension 174 designed in the  
24 shape of a tongue can be provided with multiple projections—with two  
25 projections 175, 176 in this case—the free ends 177, 178 of which are also  
26 designed in the shape of a bezel. The function of these means of attachment fully  
27 corresponds to the function of the means of attachment according to Figures 3  
28 through 5.

29  
30 In both example cases, means of attachment 74, 76, 78, and 174, 175, 176, 177,  
31 178 are situated on the carrier element 12 and on a transverse rib 36 belonging



1 to this that serve to secure the wiper bar 14 against the carrier element 12 in its  
2 longitudinal direction. Since, as explained previously, the part 16 of the  
3 connecting device is also a transverse rib of the carrier element, it is feasible to  
4 situate corresponding means of attachment on the part 16.

5  
6 Instead of relatively stiff extensions 74 and 174, the means of attachment can  
7 also be formed by elastically displaceable tongues that can be temporarily  
8 displaced out of their securing position against elastic force. The projection and  
9 the bezel could definitely be replaced with means of attachment designed in the  
10 shape of claws or barbs.

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